



Content  
Community  
Connection

United States  
One Franklin Square, Suite 302  
Geneva, NY 14456  
Tel: 315-7889-8323  
Fax: 315-789-8940

Canada  
1885 Clements Rd, Unit 218  
Pickering, ON L1Z 1X5  
905-686-1040  
Tel: Fax 905-686-1078  
Toll Free: 1-855-824-6131

## Electrical Troubleshooting Training

Contact us Today for a FREE quotation to deliver this course at your company's location.

<https://www.electricityforum.com/onsite-training-rfq>

Our Electrical Troubleshooting Training course teaches how important it is to establishing a preventative maintenance program. The most important thing is to maintain the uptime of electrical equipment and significantly reduce both planned and unplanned downtime. Unplanned downtime costs are difficult to calculate, but often significant. For some industries, it can represent 1 to 3 per cent of revenue (potentially 30 per cent to - 40 per cent of profits) annually.

This dynamic and interactive electrical testing and troubleshooting course will review equipment necessary to perform a Site Survey, such as industry oscilloscopes and Multimeters, Power Quality Analyzers, Current Clamp meters, and Mini Infrared Thermometers.

- Learn how to perform insulation tests, insulation voltages, plus a wide range of DMM tasks with confidence and ease. Necessary for work on generators, transformers, motors, cables and switchgear.

- Learn how to accurately measure AC current without breaking the circuit
- Check for hot spots and measure temperature with the Mini non-contact thermometers.
- Measure voltage level, current balance, harmonics, power, energy, power factor, displacement power factor, determine bad or marginal circuit breakers and other electric power components.

### **Preventive Electrical Maintenance**

Insurance claims data demonstrate that roughly half of the cost associated with electrical failures could be prevented by regular maintenance. To determine the cost of a failure, it helps to consider three key categories: Loss of income due to downtime, cost of labor to troubleshoot, repair and restart and cost of damage equipment.

Inexperience and poor planning will inevitably result in prolonged delays in electrical equipment start up which can lead to costly productivity losses. This course provides invaluable information to anyone who wishes to know and understand the role of Electrical testing and troubleshooting of electric power systems. The importance of planning and preparation for electrical testing projects, from engineering to testing, troubleshooting and commissioning and eventual start up, will be emphasized. This course deals with safety considerations and testing and troubleshooting for all the components of any electrical system.

**Our Electrical Troubleshooting Training course will include practical information on how to troubleshoot:**

- Generator failures
- Motor failures
- Transformer failures
- Circuit breaker/relay/fuse failures
- UPS & Battery System failures
- Cable failures

- PLC failures

### WHO SHOULD ATTEND

Industrial, commercial and institutional electrical maintenance personnel, plant electricians, electrical testing technicians, testing engineers, electrical technologists, plant managers, operating and maintenance personnel and all individuals involved in electrical equipment maintenance, testing and commissioning.

### STUDENTS RECEIVE

- FREE 100-Page Digital Electrical Maintenance Handbook (Value \$20)
- \$100 Coupon Toward any Future Electricity Forum Event (Restrictions Apply)
- 1.4 Continuing Education Unit (CEU) Credits
- FREE Magazine Subscription (Value \$25.00)
- Course Materials in Paper Format

### COURSE OUTLINE

#### DAY ONE

#### **Introduction to Electrical System Troubleshooting**

- Skills and qualifications required to perform testing and troubleshooting
- Systematic Approach to Electrical System Troubleshooting
- Documentation Required to Perform Troubleshooting

- Electrical System Parameters Trending
- Safety requirements- CSA Z462

### **Electrical Safety Requirements during System installation and Equipment Maintenance**

- Construction Site Considerations
- Safety during electrical testing
- Temporary generators and construction power
- Personal Protective Equipment Voltage Detection Equipment, Hot-sticks, Grounds
- Temporary Grounds
- Interlocking
- Tagging and Permits
- Qualified Electrical Personnel
- Roles and duty of Authorizing Testing Personnel

### **Testing Procedures**

- DC Voltage Testing Techniques
- Insulation resistance tests
- Step voltage and high voltage tests
- Testing power factor correcting capacitors
- AC Voltage Testing Techniques
- Power factor and dissipation factor tests

### **Electrical Testing Low Voltage Equipment**

- Generators and Backup Generators
- Vibration monitoring
- ATS – Automatic Transfer System
- UPS & Battery Systems
- VFD –Current and Voltage, Scalar Vector and Direct Torque Control type
- Complex Electromechanical systems
- AC and DC Motors
- PLC and PAC Systems
- Robotics and Servo systems
- Industrial Networks
- MCC and Motor Generator Group Systems
- Motor and Generators Relay Protection
- Typical Predictive maintenance example for Motors and Drive System

### **Medium Voltage Equipment Troubleshooting**

- Switchgear Troubleshooting
- Medium Voltage Circuit Breakers and re-closures: Vacuum; SF6 and Oil Types
- Medium Voltage Buss Bars
- Medium Voltage Switches
- Power Fuses and Supports
- Power Electronics and Power Factor Correction Systems
- Medium Voltage Instrumentation
- Switchgear Relay Protection Systems
- SCADA, RTU and Bay Controllers
- Predictive Maintenance for Switchgear and Medium Voltage Breakers

### **DAY TWO**

## **Remote Instrumentation and On-Line Monitoring Systems**

- Implementing Transformer Vibration monitoring System- LAB VIEW
- Transformer Oil Monitoring systems
- ETAP Remote monitoring System for High and Medium Voltage
- PI System Parameter Monitoring and Trending
- Medium Voltage Motors Monitoring System
- Generator Monitoring System Using Rockwell Technology

## **Grounding System Maintenance and Testing requirements**

- Testing requirements of the grounding systems
- Instrumentation used for testing grounding systems
- Corrective action plan to maintain Grounding Systems Parameters: GPR; Touch and Step Potential
- Safety Grounding and Bonding
- Avoiding Ground loop

## **High Voltage Testing and Troubleshooting**

- Switchyards and high power systems
- High voltage SF6 Breakers Troubleshooting
- High voltage switches
- MCOV Testing
- Underground and Overhead Transmission Systems
- Typical Instrumentation used for High voltage systems

- Relay Protection Systems
- SCADA Systems, RTU
- Predictive Maintenance requirements for High Voltage Breakers

### **Power Transformers Troubleshooting**

- Main Core System
- Bushing System
- On Load and Off Load Tap Changer
- Oil Parameters-DGA
- Ventilation and Cooling Systems
- Auxiliary Systems and Instrumentation
- Transformer Relay Protection
- Power Transformer Troubleshooting Example
- Power Transformer Predictive Maintenance and Life expectation

### **COURSE TIMETABLE**

#### **Both days:**

Start: 8:00 a.m.

Coffee break: 10:00 a.m.

Lunch: 12:00 noon

Finish: 4:30 p.m.

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